From Data Tracing to Value Creation in First Industrial Applications

The 13th GIO Roundtable, Barcelona Feb 27th 2024

Prof. Dr. Juergen Grotepass, CSO Manufacturing Europe
Huawei Technologies Duesseldorf GmbH

ZVEI Working Group “AI in Automation”

Value Creation Trends triggered by 2030 Vision for Industry 4.0 +

- ❖ Rise of Data Spaces for data sharing 2020-2024:
- Advanced Systems Engineering for Value Creation
- Creation and Operation of New Market Places, Data Spaces & Services

- ❖ Rise of AI to support Value Creation 2024:
- Interactive Human-Machine Dialogue (chatGPT)
- Generative AI for consumer & automotive industry
- Risk Based Regulation of AI (AI Act)

Data Spaces Evolving

	Catena-X LIVE	energy data-X	Health-X dataLOFT	Mobility Data Space LIVE
Industry	▪ Automotive	▪ Energy	▪ Health Care	▪ Mobility
Ecosystem	▪ BMW, Ford, Mercedes, Stellantis, Volkswagen etc. ▪ Denso, Schaeffler, ZF Friedrichshafen etc. ▪ …	▪ Amprion, E.On, EWENetz, Tennet etc. ▪ Eviden, Microsoft etc. ▪ …	▪ Charité ▪ Bundesdruckerei, IONOS, Siemens Healthineers ▪ …	▪ BMW, Deutsche Bahn, Deutsche Post, Mercedes ▪ Bundesländer BY, BW, and NW ▪ …
Use Scenarios	▪ Circular economy ▪ Supply chain transparency ▪ Quality management	▪ Cross-sector flexibilization of energy consumption and supply ▪ End-to-end balancing group management	▪ Autonomous elderly health ▪ Clinical assistant ▪ Personalized health care services	▪ Traffice management ▪ Modal shift ▪ Parking space management
Business Rationale	▪ »Cost Sharing« ▪ Joint innovation	▪ Joint innovation ▪ Societal benefit	▪ Joint innovation ▪ Societal benefit	▪ Joint innovation ▪ Societal benefit

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Digital Product Passport 4.0 (DPP4.0) – AAS for CO2 Tracing of Products

ZVEI Demonstrator showcases data tracing in supply chain of highly integrated products at Digitalkonferenz, Hannoverfair 2024, SPS/IPC drives in Nueremberg

Overall PCF Value summed up over all individual PCF values based on Asset Administration Shells

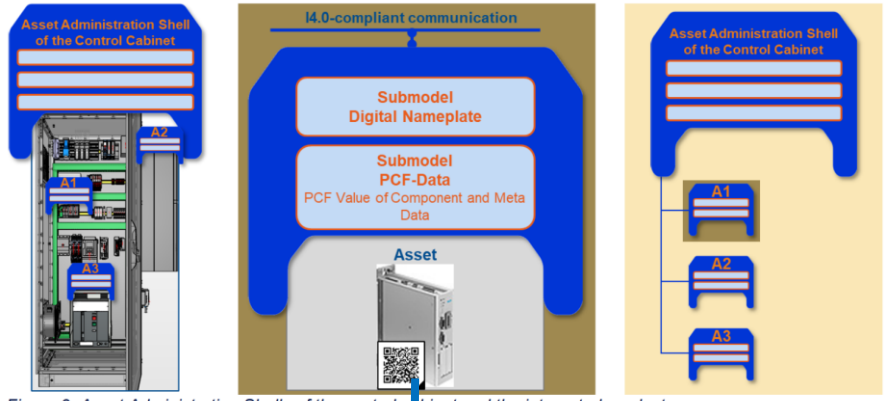


Figure 9: Asset Administration Shells of the control cabinet and the integrated products

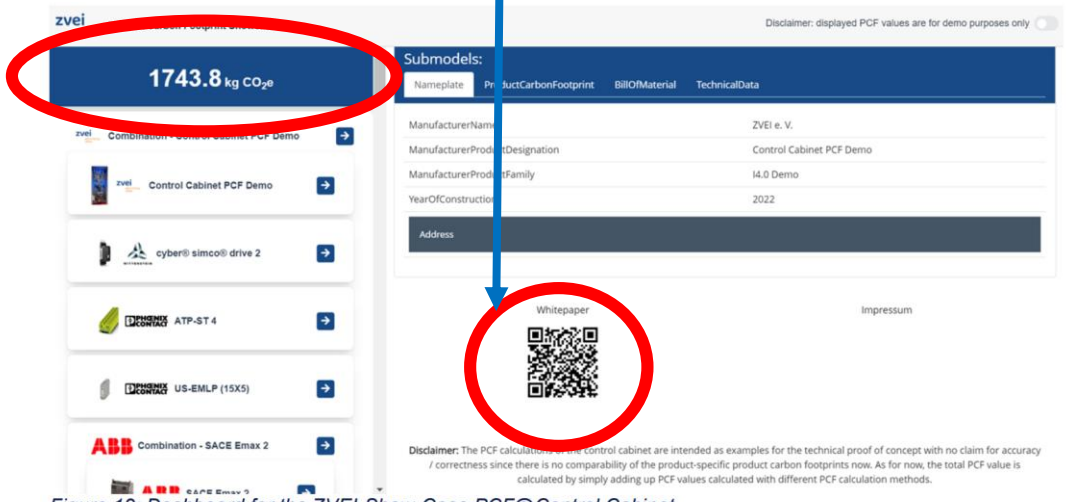
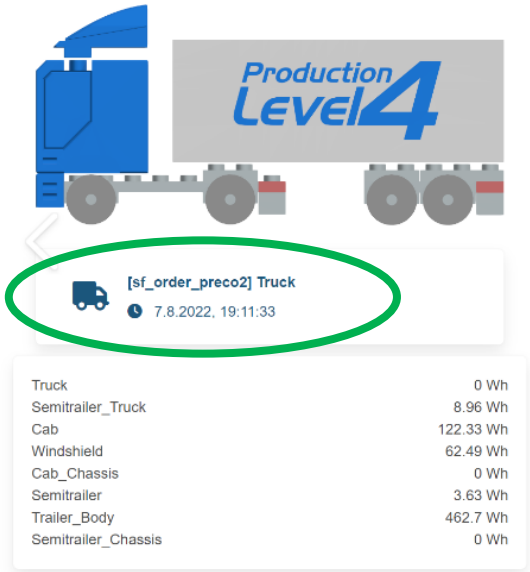


Figure 12: Dashboard for the ZVEI-Show-Case PCF@Control Cabinet

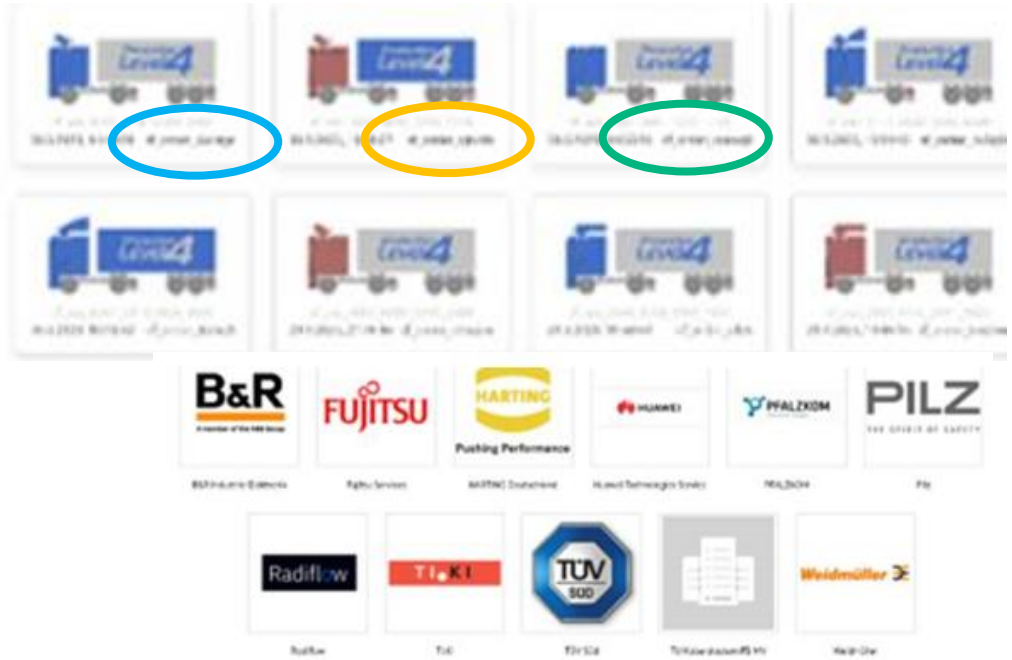
Sustainable Shared Production – AAS for CO2 Tracing in Manufacturing

smartFactory KL



660,11 Wh
Energy Consumption

1.171,075 kg
CO2 Consumption



dfki ai

TWIN4TRUCKS

Key Innovations:

- User Configuration of Product Design / Requirements
- Manufacturing Capabilities are described as AAS in Marketplace
- Sustainable “Manufacturing as a Service” Use Case of Shared Production

➔ **Follow-Up as BMWK funded R&D Project:** “TWIN4Trucks”

TWIN4TRUCKS

Manufacturing as a Service as Catena-X Use Case

Catena-X Automotive Network

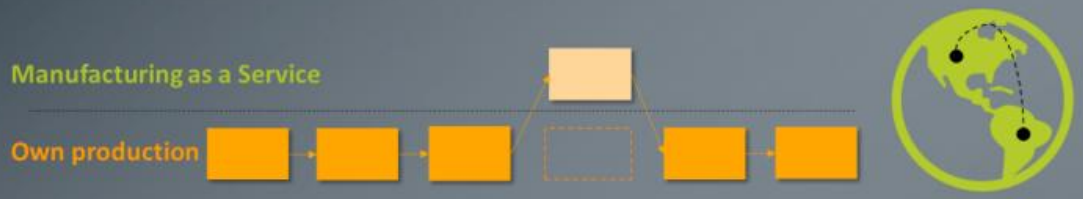
DPP as Building Block in Market places: # Resilence of supply chains and # sustainability

Paradigm Shift

BUYER VIEW

MaaS opens the world for flexible production

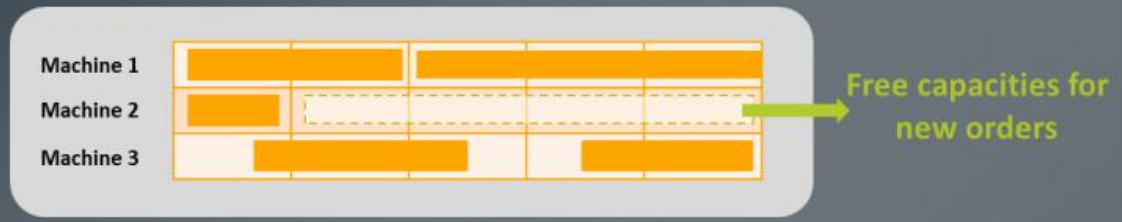
- Unleash limitation to your own equipment
- Unleash limitation to your resources
- Unleash limitation to one location
- Unleash limitation to fixed partners



SUPPLIER VIEW

MaaS generates new market opportunities

- Offering free capacities in an open market place
- Close gaps with available resources



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DPP within newest GARTNER Hype Cycle for Sustainability 2023 Analysed as an "Innovation Trigger"

zvei
electrifying ideas

Digital Product Passport 4.0

Gartner

Figure 1: Hype Cycle for Sustainability, 2023

Gartner

Why we need a Digital Product Passport

Maximize
Product Transparency

Fulfill
Regulatory Compliance

Improve
Circularity Potential

How Catena-X supports Digital Product Passes

Standardized data model that specifies the content of a passport

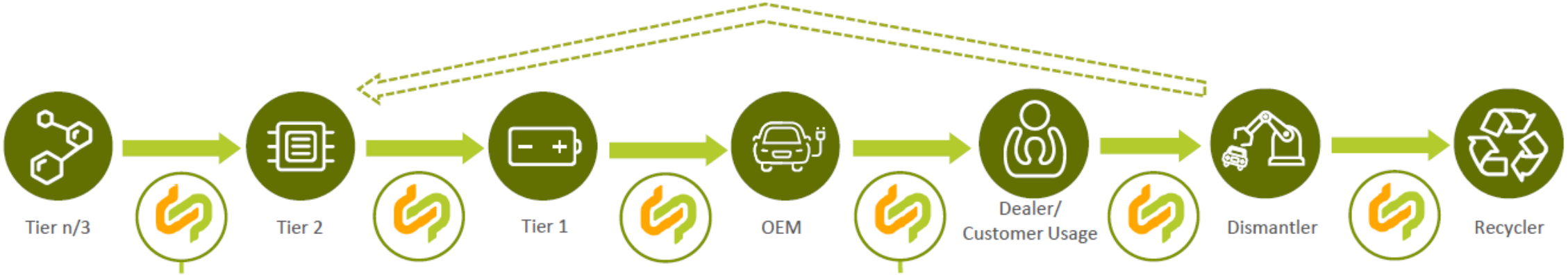
Infrastructure for providing and consuming data

Application for accessing and viewing the passport

→ Started with a “Battery Passport”

Value Derivation in the trusted Catena-X data space

Catena-X
Automotive Network



Harmonized infrastructure

Your data is your data. Always.

Standardized data exchange

Catena-X Standard Library
Catena-X DataModel

BatteryPass Viewer App

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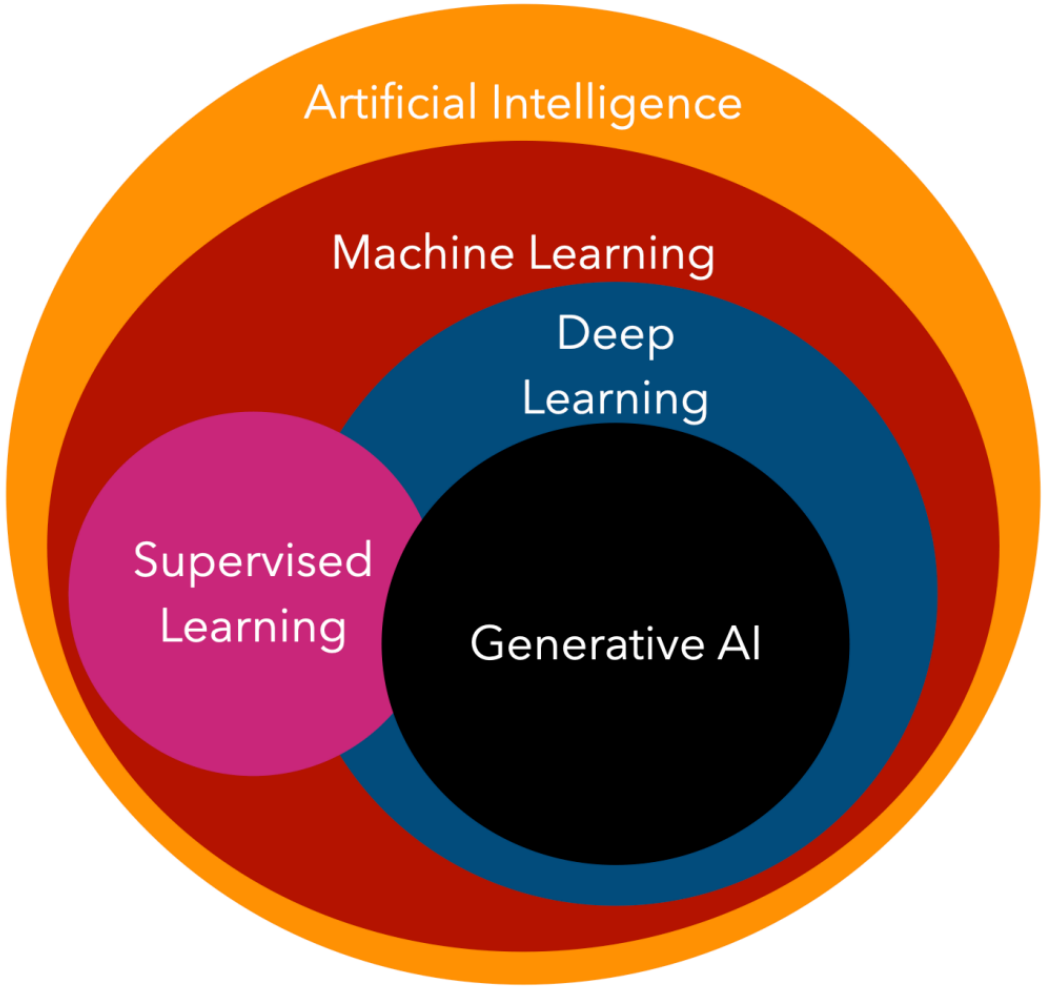
Taxononomy of AI related Disciplines



Generative artificial intelligence (GenAI) tools **are an emerging class of new-age artificial intelligence** algorithms capable of producing **novel content** — in varied formats such as text, audio, video, pictures, and code — based on user prompts.

Recent advances in machine learning (ML), massive datasets, and substantial increases in computing power have propelled such tools **to human-level performance** on academic and professional benchmarks.

Industry developments include generated code for PLC programming (Siemens & Microsoft at Hannover Fair 2023) and 3d Printing of robot grippers

Automotive Solutions at CES (consumer technology association Jan 2024)

ChatGPT based driver assistant with interactive dialog function

Generative AI Added Value in Industry

https://www.linkedin.com/pulse/unleashing-power-generative-ai-large-language-models-engineering-das/

Bing Image Creator powered by Dall-E! : AI has generated a picture for OPC UA-Communication from Edge to Cloud with Lego

Use Case 1: Product Design Optimization - Influence of Generative AI and LLMs on AR/VR and 3D Printing

Use Case 2: Quality Control and Inspection - Influence of Generative AI and LLMs on AR/VR and Computer Vision

Use Case 3: Robotic Process Automation (RPA) - Influence of Generative AI and LLMs on RPA and Intelligent Robotics

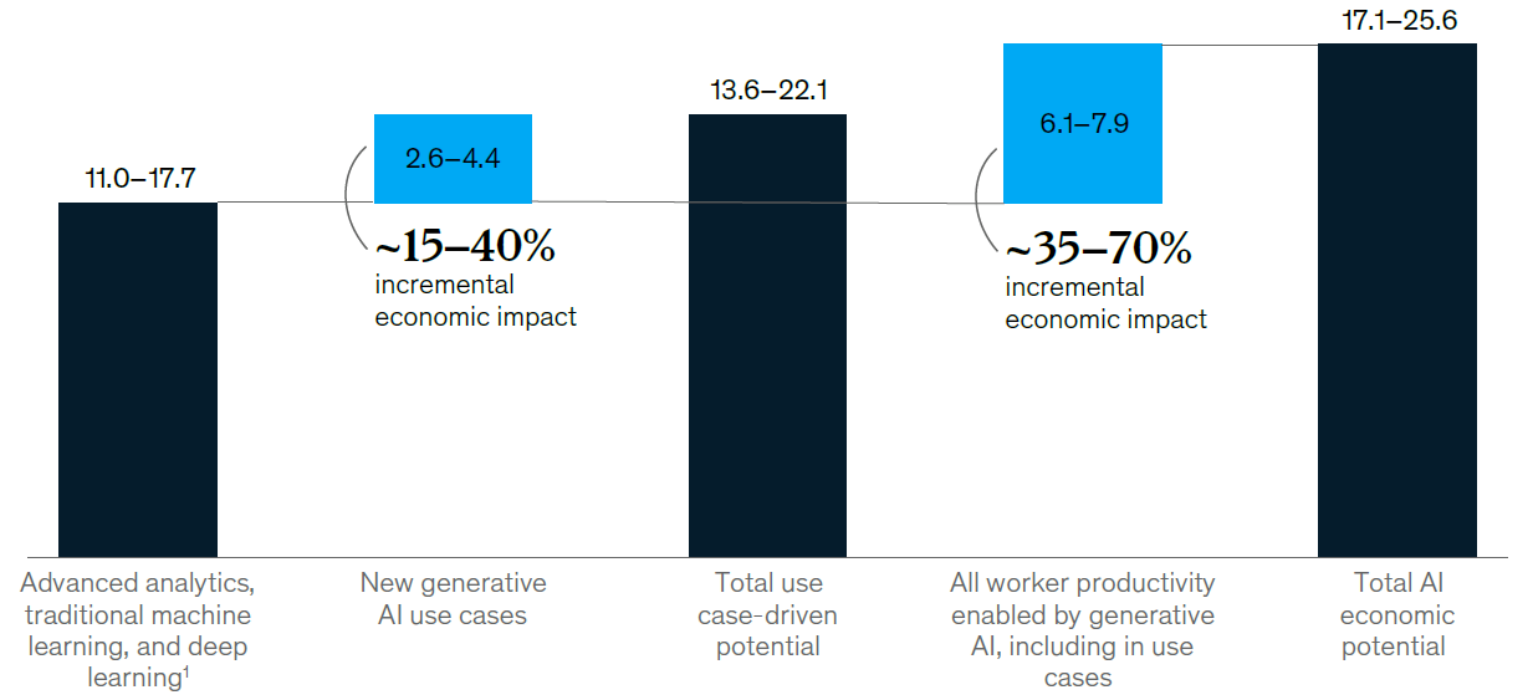
Use Case 4: Industrial Internet of Things (IIoT) and Data Analytics - Influence of Generative AI and LLMs on IIoT and Data Analysis

Use Case 5: Cybersecurity and Threat Detection - Influence of Generative AI and LLMs on Cybersecurity

Use Case 6: Cloud Computing for Scalability and Collaboration - Influence of Generative AI and LLMs on Cloud Computing

Generative AI Added Value in Industry

AI's potential impact on the global economy, $ trillion

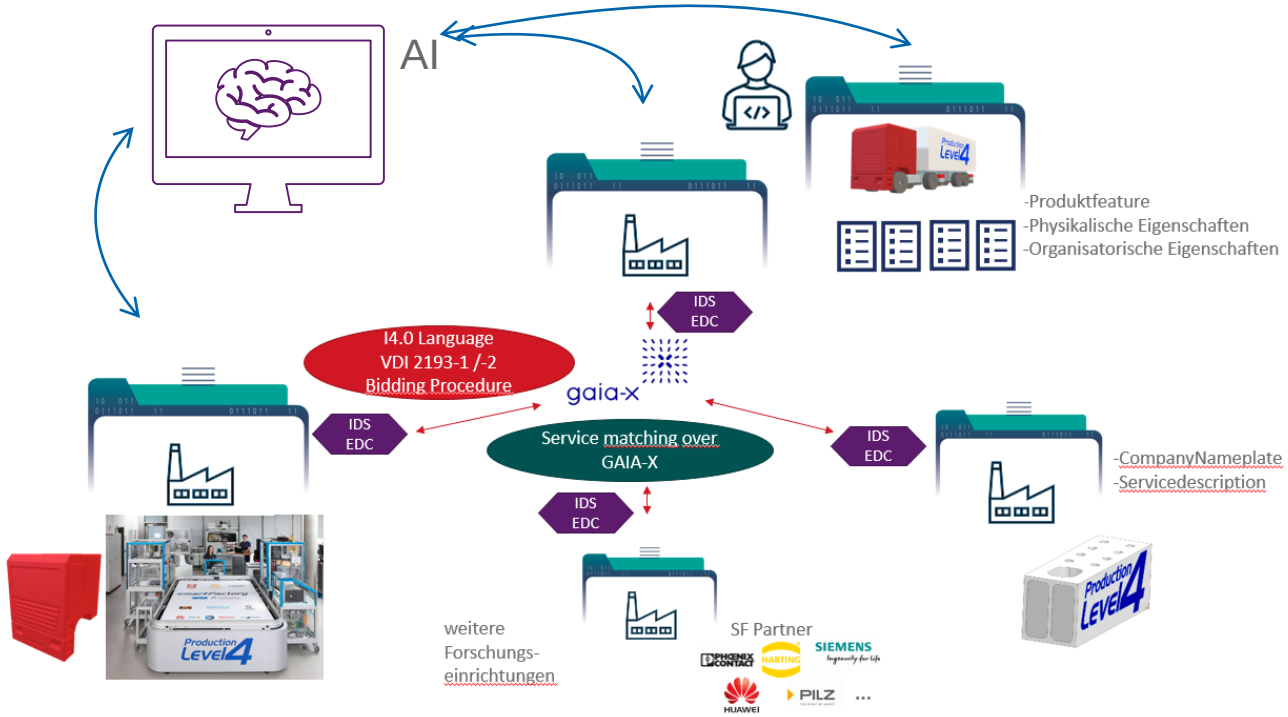


[1]Updated use case estimates from "Notes from the AI frontier: Applications and value of deep learning," McKinsey Global Institute, April 17, 2018.

McKinsey & Company

AI supported Engineering in Manufacturing - Connecting Skills via AAS

Using IDS / EDC - Eclipse Dataspace connector for GAIA-X compliant value generation in shared production
AI to support skill evaluation, partner matchmaking, automated auction & contracting



smart MA-X

smartFactory KL

HANNOVER MESSE

Outlook on Generative AI supporting MaaS in Marketplaces

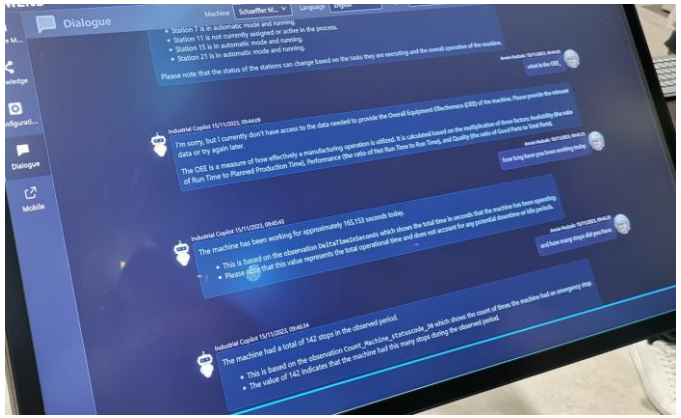
BUYER VIEW

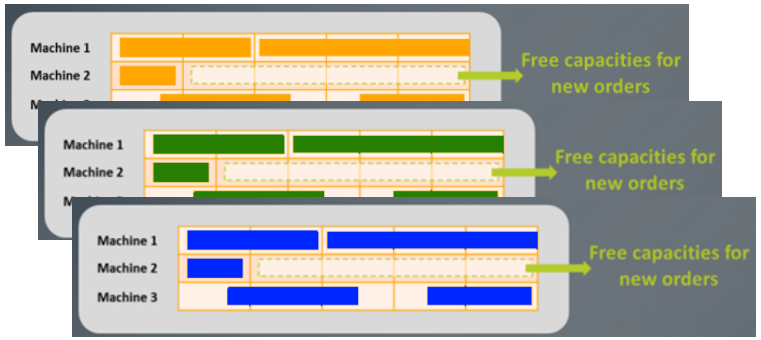
MaaS opens the world for flexible production

SUPPLIER VIEW

MaaS generates new market opportunities

Please analyze supply-chain in Catena-X data space and help to configure best matching partners for the smallest PCF footprint in end-to-end battery cells production





Service provider	CO2 footprint	Energy consumption	Localization	Price	Delivery time
Supplier 1					
Supplier 2					
Supplier 3					

Thank you for your attention